Sec. 2.3 : Permutations Formula

$$_nP_r = \frac{n!}{(n-r)!}$$

Calculator type ⇒ $_6P_4 = 360$

Simplifying type ⇒ $_nP_2 = 20$

$$\frac{n!}{(n-2)!} = 20$$

$$\frac{n\cdot(n-1)\cancel{(n-2)!}}{\cancel{(n-2)!}} = 20$$

$$n\cdot(n-1) = 20$$

$$n^2 - n = 20$$

$$n^2 - n - 20 = 0$$

add ⇒ −1
mult ⇒ −20
4 & −5

$$(x+4)(x-5) = 0$$

$\cancel{x = -4}$ $\boxed{x = 5}$

3) $_{n+1}P_2 = 72$

$nP_r = \frac{n!}{(n-r)!}$

$$\frac{(n+1)!}{(n+1-2)!} = 72$$

$$\frac{(n+1)!}{(n-1)!} = 72$$

$$\frac{(n+1)\cdot n\cdot (n-1)!}{(n-1)!} = 72$$

$$(n+1)\cdot n = 72$$

$$n^2+n = 72$$

$$n^2+n-72 = 0$$

add ⇒ 1
mult ⇒ -72
$-8 + 9$

$$(n-8)(n+9) = 0$$

$n = 8$ $n \neq -9$

Sec: 2.4 : Permutations with Identical Objects

Ex

5 Math books, 2 science, & 3 English.
Each subject being the same book.

MMMMMSSEEE

$$P = \frac{n!}{a!b!c!\ \text{etc.}}$$

$\frac{\text{total \#!}}{a!\,b!\,c!\,}$ → cancelling out repeats

$$\Rightarrow \frac{10!}{5!2!3!} = 2520 \text{ ways}$$

1. SASKATOON

$$\frac{9!}{2!2!2!}$$

2 'S
2 'A'
2 'O'